

Turcon® Excluder® F



Double-acting

Rubber-energized Double-acting Scraper

Material:

Turcon®, Zurcon® and Elastomer





■ Turcon® Excluder® F



■ Description

Turcon® Excluder® F is a double-acting scraper with scraper lip and sealing lip, positioned back-to-back. The scraper is always installed with 2 O-Rings as elastic energizing elements in one groove. The scraper function itself is performed by the Excluder® F Turcon® element. The O-Rings maintains the pressure of the scraper lips against the sliding surface and compensates deflections of the piston rod.

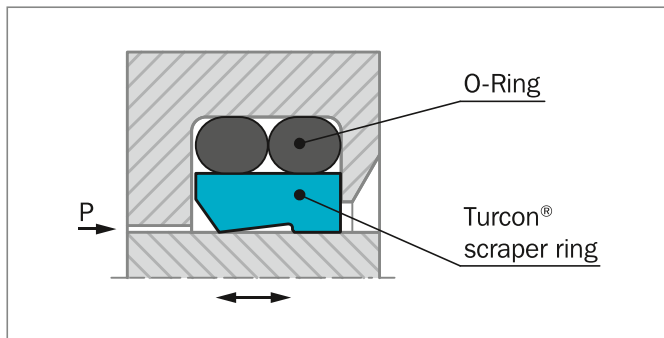


Figure 171: Turcon® Excluder® F

EXCLUDER® F HAS TWO FUNCTIONS:

- Scrape contaminants from the retracting piston rod to protect the system from soiling
- Hold back the residual oil film on the extending piston rod on the medium side.
- Excluder® F is preferably used in conjunction with our rod seals Turcon® Stepseal® 2K or Zurcon® Rimseal, i.e. seals with a hydrodynamic back-pumping function. Application wise the Excluder® F is placed between Excluder® 2 and Excluder® 5 for medium to "light-heavy" duty such as in:
 - Light construction machinery
 - Truck crane
 - Agriculture machines
 - Hydraulic presses
 - Injection molding machines
 - Hydraulic actuators

ADVANTAGES

In principle the same as for Excluder® 2 and 5:

- Outstanding sliding properties
- Stick-slip-free, no sticking for Turcon® materials
- Tough scraper particular in Zurcon® materials
- Can compensate for deflections of the piston rod or plunger
- Very good scraping effect even against firmly adhered dirt, etc.
- Very good sealing effect from the inside against the residual oil film adhering to the surface of the piston rod
- Identical installation as Zurcon® Excluder® 500 and Excluder® 5 from WE50 to WE52
- Very high resistance to hydraulic media
- Available for diameters from 19 up to 1,500 mm
- ISO 6195 Type D installation on recommended diameters from 40 to 140 mm

DISADVANTAGES COMPARED TO EXCLUDER® 2 AND 5

- Require 2 pcs O-Rings
- Not completely axially locked in the groove
- More disposed to wrong installation

ADVANTAGES COMPARED TO EXCLUDER® 2 AND 5

- Easy installation in closed groove
- Improved radial flexibility
- Improved sealing function due to O-Ring arrangement



OPERATING CONDITIONS

| | |
|---------------------|---|
| Speed: | 15 m/s for Turcon® materials 2 m/s for Zurcon® Z80 materials 1 m/s for Zurcon® Z53/Z54 materials |
| Temperature: | -45 °C to +200 °C (Turcon®) -60 °C to +80 °C (Zurcon® Z80) -45 °C to +110 °C (Zurcon® Z53/Z54) depending on O-Ring materials |
| Media: | Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water, air and others, depending on scraper and O-ring material compatibility. |

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, environment, temperature and media.

INSTALLATION INSTRUCTIONS

All Excluder® F scrapers are preferably installed in closed grooves - installation dimensions see Table 160.

MATERIALS

The following material combinations have proven effective for most applications:

Turcon® Excluder® F in Turcon® M12

All round material for hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

| | | |
|---------|----------------|---|
| O-Ring: | NBR 70 Shore A | N |
| | FKM 70 Shore A | V |

Set code: M12N or M12V

Turcon® Excluder® F in Turcon® T46

For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

| | | |
|---------|----------------|---|
| O-Ring: | NBR 70 Shore A | N |
| | FKM 70 Shore A | V |

Set code: T46N or T46V

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 159.

**Table 159: Turcon® and Zurcon® Materials for Excluder® F**

| Material, Applications, Properties | Code | O-Ring Material Shore A | Code | O-Ring Operating Temp. * °C | Mating Surface Material | Speed max. m/s |
|--|------|-------------------------|------|-----------------------------|---|----------------|
| Turcon® M12 First material choice for linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on scrapers Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray | M12 | NBR 70 | N | -30 to +100 | Steel | 15 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, hardened Steel, chrome plated (rod) | |
| | | FKM 70 | V | -10 to +200 | Steel plated (rod) Cast iron Stainless steel Titanium | |
| Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas Carbon fiber filled Color: Gray | T40 | NBR 70 | N | -30 to +100 | Steel | 15 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, chrome plated (rod) Cast iron | |
| | | FKM 70 | V | -10 to +200 | Stainless steel | |
| | | EPDM 70 | E** | -45 to +145 | Aluminum | |
| Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading. | T46 | NBR 70 | N | -30 to +100 | Steel, hardened | 15 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, chrome plated (rod) Cast iron | |
| | | FKM 70 | V | -10 to +200 | | |
| Zurcon® Z53 For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish More difficult to install Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown | Z53 | NBR 70 | N | -30 to +100 | Steel | 1 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, hardened Steel chrome plated (rod) Cast iron Ceramic coating Stainless steel | |

Table continues on next page



| Material, Applications, Properties | Code | O-Ring Material Shore A | Code | O-Ring Operating Temp.* °C | Mating Surface Material | Speed max. m/s |
|---|------------|-------------------------|------|----------------------------|--|----------------|
| Zurcon® Z54 For mineral oil based fluids High abrasion resistance For counter surface with rougher surface finishes Good extrusion resistance Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Turquoise | Z54 | NBR 70 | N | -30 to +100 | Steel | 1 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, hardened Steel, chrome plated (rod) Cast iron Stainless steel Aluminum Ceramic coating | |
| Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) | Z80 | NBR 70 | N | -30 to +100 | Steel | 2 |
| | | NBR 70 Low temp. | T | -45 to +80 | Steel, chrome plated (rod) Stainless steel | |
| | | EPDM 70 | E** | -45 to +145 | Aluminum Ceramic coating | |

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil, except EPDM.

** Material not suitable for mineral oils.

BAM: Tested by "Bundesanstalt Materialprüfung, Germany".

 Highlighted materials are recommended.



Installation Recommendation

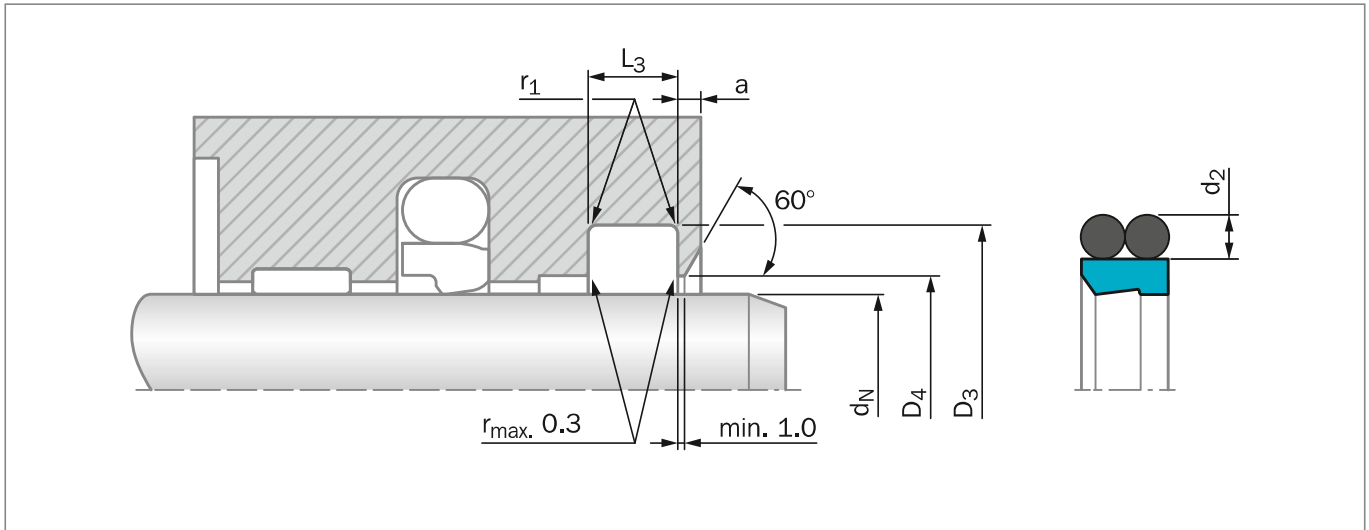


Figure 172: Installation Drawing

Table 160: Installation Dimensions – Standard Recommendations

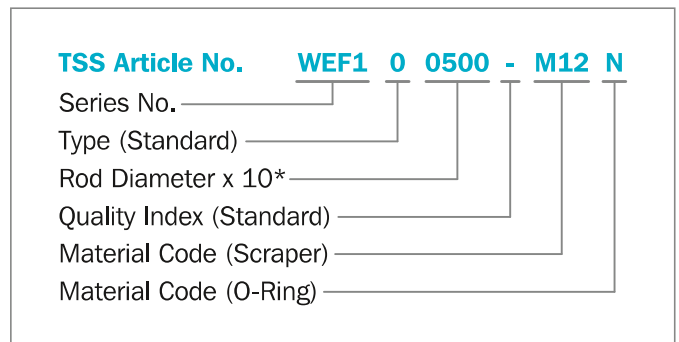
| Series No. | Rod d_N f8/h9 | | Groove Diameter | Groove Width | Bore Diameter | Step Width | Radius | O-Ring Cross Section |
|------------|----------------------|-----------------|-----------------|--------------|---------------|------------|-----------|----------------------|
| | Standard Application | Available Range | D_3 H9 | L_3 +0.2 | D_4 H11 | a_{min} | r_1 max | d_2 |
| WEF0 | 19 - 39.9 | 19 - 130 | $d_N + 7.6$ | 4.2 | $d + 1.0$ | 3.0 | 0.4 | 1.78 |
| WEF1 | 40 - 69.9 | 30 - 250 | $d_N + 8.8$ | 6.3 | $d + 1.5$ | 3.0 | 1.0 | 2.62 |
| WEF2 | 70 - 139.9 | 50 - 450 | $d_N + 12.2$ | 8.1 | $d + 2.0$ | 5.0 | 1.2 | 3.53 |
| WEF3 | 140 - 399.9 | 80 - 650 | $d_N + 16.0$ | 11.5 | $d + 2.0$ | 5.0 | 2.0 | 5.33 |
| WEF4 | 400 - 649.9 | 180 - 650 | $d_N + 24.0$ | 15.5 | $d + 2.5$ | 8.0 | 2.5 | 7.00 |
| WEF5 | 650 - 999.9 | 300 - 999.9 | $d_N + 27.3$ | 18.0 | $d + 2.5$ | 10.0 | 2.5 | 8.40 |
| WEF5X | 1,000 - 1,500 | | $d_N + 27.3$ | 18.0 | $d + 2.5$ | 10.0 | 2.5 | 8.40 |

ORDERING EXAMPLE

Turcon® Excluder® F complete with O-Ring, standard application:

| | |
|----------------------|--------------------------|
| Series: | WEF1 from Table 160 |
| Rod Diameter: | $d_N = 50.0$ mm |
| TSS Part No.: | WEF100500 from Table 161 |

Select the material from Table 159. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:



* For diameters $d_N \geq 1,000.0$ mm multiply only by factor 1.
 Example: WEF5 for diameter $d_N = 1,200.0$ mm
 TSS Article No.: WEF5X1200-M12N



Table 161: Installation Dimensions / TSS Part Numbers

| Rod Dia. | Groove Dia. | Groove Width | TSS Part No. | O-Ring Size | Rod Dia. | Groove Dia. | Groove Width | TSS Part No. | O-Ring Size |
|-------------------------|----------------------|------------------------|------------------|----------------------|-------------------------|----------------------|------------------------|------------------|----------------------|
| d _N f8/h9 | D ₃ H9 | L ₃ +0.2 | | | d _N f8/h9 | D ₃ H9 | L ₃ +0.2 | | |
| 19.0 | 26.6 | 4.2 | WEF000190 | 23.52 x 1.78 | 125.4 | 137.6 | 8.1 | WEF201254 | 129.77 x 3.53 |
| 20.0 | 27.6 | 4.2 | WEF000200 | 23.52 x 1.78 | 130.0 | 142.2 | 8.1 | WEF201300 | 136.12 x 3.53 |
| 22.0 | 29.6 | 4.2 | WEF000220 | 26.70 x 1.78 | 135.0 | 147.2 | 8.1 | WEF201350 | 139.29 x 3.53 |
| 25.0 | 32.6 | 4.2 | WEF000250 | 28.30 x 1.78 | 140.0* | 152.2 | 8.1 | WEF201400 | 145.64 x 3.53 |
| 28.0 | 35.6 | 4.2 | WEF000280 | 31.47 x 1.78 | 140.0* | 156.0 | 11.5 | WEF301400 | 145.42 x 5.33 |
| 30.0 | 37.6 | 4.2 | WEF000300 | 34.65 x 1.78 | 140.5 | 156.5 | 11.5 | WEF301405 | 145.42 x 5.33 |
| 32.0 | 39.6 | 4.2 | WEF000320 | 34.65 x 1.78 | 150.0 | 166.0 | 11.5 | WEF301500 | 151.77 x 5.33 |
| 35.0 | 42.6 | 4.2 | WEF000350 | 37.82 x 1.78 | 153.0 | 169.0 | 11.5 | WEF301530 | 158.12 x 5.33 |
| 36.0 | 43.6 | 4.2 | WEF000360 | 41.00 x 1.78 | 155.0 | 171.0 | 11.5 | WEF301550 | 158.12 x 5.33 |
| 40.0* | 48.8 | 6.3 | WEF100400 | 44.12 x 2.62 | 160.0* | 172.2 | 8.1 | WEF201600 | 164.69 x 3.53 |
| 42.0 | 50.8 | 6.3 | WEF100420 | 45.69 x 2.62 | 160.0* | 176.0 | 11.5 | WEF301600 | 164.47 x 5.33 |
| 45.0* | 53.8 | 6.3 | WEF100450 | 48.90 x 2.62 | 165.0 | 181.0 | 11.5 | WEF301650 | 170.82 x 5.33 |
| 48.0 | 56.8 | 6.3 | WEF100480 | 52.07 x 2.62 | 170.0 | 186.0 | 11.5 | WEF301700 | 177.17 x 5.33 |
| 50.0* | 58.8 | 6.3 | WEF100500 | 53.64 x 2.62 | 175.0 | 191.0 | 11.5 | WEF301750 | 177.17 x 5.33 |
| 52.0 | 60.8 | 6.3 | WEF100520 | 55.25 x 2.62 | 180.0* | 192.2 | 8.1 | WEF201800 | 183.74 x 3.53 |
| 55.0 | 63.8 | 6.3 | WEF100550 | 58.42 x 2.62 | 180.0* | 196.0 | 11.5 | WEF301800 | 183.52 x 5.33 |
| 56.0* | 64.8 | 6.3 | WEF100560 | 59.99 x 2.62 | 188.2 | 204.2 | 11.5 | WEF301882 | 189.87 x 5.33 |
| 60.0 | 67.6 | 4.2 | WEF000600 | 63.22 x 1.78 | 190.0 | 206.0 | 11.5 | WEF301900 | 196.22 x 5.33 |
| 60.0 | 68.8 | 6.3 | WEF100600 | 63.17 x 2.62 | 200.0* | 212.2 | 8.1 | WEF202000 | 202.79 x 3.53 |
| 63.0* | 71.8 | 6.3 | WEF100630 | 66.34 x 2.62 | 200.0* | 216.0 | 11.5 | WEF302000 | 202.57 x 5.33 |
| 65.0 | 73.8 | 6.3 | WEF100650 | 67.95 x 2.62 | 220.0* | 232.2 | 8.1 | WEF202200 | 221.84 x 3.53 |
| 70.0* | 78.8 | 6.3 | WEF100700 | 72.69 x 2.62 | 220.0* | 236.0 | 11.5 | WEF302200 | 221.62 x 5.33 |
| 70.0* | 82.2 | 8.1 | WEF200700 | 75.79 x 3.53 | 240.0 | 256.0 | 11.5 | WEF302400 | 247.02 x 5.33 |
| 75.0 | 87.2 | 8.1 | WEF200750 | 78.97 x 3.53 | 250.0* | 262.2 | 8.1 | WEF202500 | 253.59 x 3.53 |
| 80.0* | 88.8 | 6.3 | WEF100800 | 82.22 x 2.62 | 250.0* | 266.0 | 11.5 | WEF302500 | 253.37 x 5.33 |
| 80.0* | 92.2 | 8.1 | WEF200800 | 85.32 x 3.53 | 260.0 | 276.0 | 11.5 | WEF302600 | 266.07 x 5.33 |
| 85.0 | 97.2 | 8.1 | WEF200850 | 88.49 x 3.53 | 270.0 | 286.0 | 11.5 | WEF302700 | 278.77 x 5.33 |
| 90.0* | 98.8 | 6.3 | WEF100900 | 94.92 x 2.62 | 280.0* | 292.2 | 8.1 | WEF202800 | 278.99 x 3.53 |
| 90.0* | 102.2 | 8.1 | WEF200900 | 94.84 x 3.53 | 280.0* | 296.0 | 11.5 | WEF302800 | 278.77 x 5.33 |
| 92.5 | 104.7 | 8.1 | WEF200925 | 98.02 x 3.53 | 300.0 | 316.0 | 11.5 | WEF303000 | 304.17 x 5.33 |
| 95.0 | 107.2 | 8.1 | WEF200950 | 101.19 x 3.53 | 320.0* | 332.2 | 8.1 | WEF203200 | 329.79 x 3.53 |
| 100.0* | 108.8 | 6.3 | WEF101000 | 101.27 x 2.62 | 320.0* | 336.0 | 11.5 | WEF303200 | 329.57 x 5.33 |
| 100.0* | 112.2 | 8.1 | WEF201000 | 104.37 x 3.53 | 330.0 | 346.0 | 11.5 | WEF303300 | 329.57 x 5.33 |
| 105.0 | 117.2 | 8.1 | WEF201050 | 110.72 x 3.53 | 350.0 | 366.0 | 11.5 | WEF303500 | 354.97 x 5.33 |
| 110.0* | 118.8 | 6.3 | WEF101100 | 113.97 x 2.62 | 360.0* | 372.2 | 8.1 | WEF203600 | 355.19 x 3.53 |
| 110.0* | 122.2 | 8.1 | WEF201100 | 113.89 x 3.53 | 360.0* | 376.0 | 11.5 | WEF303600 | 365.00 x 5.30 |
| 115.0 | 127.2 | 8.1 | WEF201150 | 120.24 x 3.53 | 380.0 | 396.0 | 11.5 | WEF303800 | 380.37 x 5.33 |
| 120.0 | 132.2 | 8.1 | WEF201200 | 123.42 x 3.53 | 400.0 | 424.0 | 15.5 | WEF404000 | 405.26 x 7.00 |
| 125.0* | 133.8 | 6.3 | WEF101250 | 126.67 x 2.62 | 440.0 | 464.0 | 15.5 | WEF404400 | 443.36 x 7.00 |
| 125.0* | 137.2 | 8.1 | WEF201250 | 129.77 x 3.53 | 450.0 | 474.0 | 15.5 | WEF404500 | 456.06 x 7.00 |



| Rod Dia. | Groove Dia. | Groove Width | TSS Part No. | O-Ring Size |
|-------------------------------|----------------------------|------------------------------|---------------------------|--------------------|
| d_N f8/h9 | D₃ H9 | L₃ +0.2 | | |
| 480.0 | 504.0 | 15.5 | WEF404800 | 481.38 x 7.00 |
| 500.0 | 524.0 | 15.5 | WEF405000 | 506.86 x 7.00 |
| 550.0 | 574.0 | 15.5 | WEF405500 | 557.66 x 7.00 |
| 600.0 | 624.0 | 15.5 | WEF406000 | 608.08 x 7.00 |
| 650.0 | 677.3 | 18.0 | WEF506500 | 662 x 8.40 |
| 700.0 | 727.3 | 18.0 | WEF507000 | 712 x 8.40 |
| 750.0 | 777.3 | 18.0 | WEF507500 | 762 x 8.40 |
| 800.0 | 827.3 | 18.0 | WEF508000 | 812 x 8.40 |
| 900.0 | 927.3 | 18.0 | WEF509000 | 912 x 8.40 |
| 1,000.0 | 1,027.3 | 18.0 | WEF5X1000 | 1,012 x 8.40 |
| 1,100.0 | 1,127.3 | 18.0 | WEF5X1100 | 1,112 x 8.40 |
| 1,200.0 | 1,227.3 | 18.0 | WEF5X1200 | 1,212 x 8.40 |

The rod diameters in **bold** type comply with the recommendations of ISO 3320.

* Installation in grooves according to ISO 6195 Type D

Other dimensions and all intermediate sizes up to 1,500 mm diameter including imperial (inch) sizes can be supplied upon request.